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PSYCHE

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STUDIES ON ARIZONA ANTS.
1. THE HABITS OF *CAMPONOTUS ULCEROSUS* WHEELER AND ITS IDENTITY WITH *C. BRUESI* WHEELER.

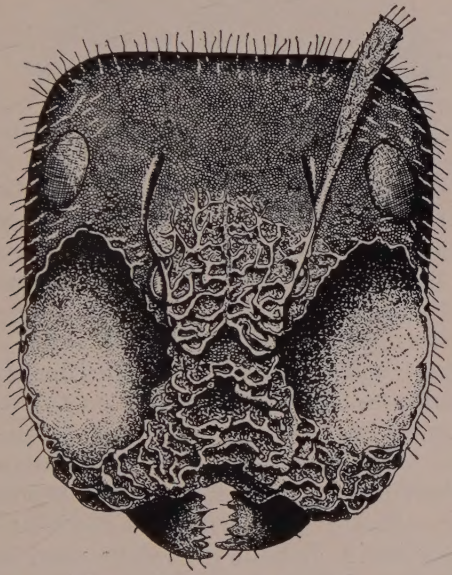
BY WM. S. CREIGHTON
Department of Biology
College of the City of New York

During the summer of 1950 the writer enjoyed the privilege of spending three weeks in the Huachuca Mountains of Arizona. This was made possible through the courtesy of Mr. Charles Bogert, Curator of Herpetology at the American Museum of Natural History. Mr. Bogert permitted us to use a four wheel drive jeep and trailer belonging to his department. We met Mr. Bogert and his party in the Huachucas and there we collected reptiles and insects. July 1950 was a very wet month in the Huachucas and the collecting, as far as the ants were concerned, was all that could have been asked. I was able to study the habits of several species which I had previously known only from cabinet specimens. I wish to express my thanks to Mr. Bogert and to the American Museum of Natural History for their part in making these studies possible.

One very surprising result of this work was the discovery that *ulcerosus* and *bruesi* are specifically identical. The insects to which these two names have been applied have hitherto been regarded not only as separate species but as representatives of separate subgenera in the genus *Camponotus.* This unusual situation has resulted from attempts to deal with wholly inadequate material. The error was, therefore, unavoidable for, as I shall show, the structure of this ant is very peculiar and no amount of logic applied to fragmentary material could have given a correct concept of the species. Before discussing these peculiarities it seems advisable to present an account of the earlier taxonomy of *ulcerosus* and *bruesi*. Several of the proposals carried in this paper depend upon previous studies on this remarkable insect.

The original description of *ulcerosus* and that of *bruesi* were both presented in a paper by W. M. Wheeler which appeared in 1910 (1). At that time the subgenera of *Camponotus* were in a rather fluid state, hence it is not surprising that Wheeler made no attempt to assign either of his species to a particular subgenus. Instead he related *bruesi* to the *novogranadensis* group and left *ulcerosus* in a group of its own. It is instructive to note that Wheeler felt that *ulcerosus* formed a link between *bruesi* and species in the subgenus *Colobopsis*. Although this view is incorrect, it shows that Wheeler was aware of a basic structural similarity in the specimens which he assigned to *bruesi* and to *ulcerosus*. With adequate material for study the importance of this similarity would have been appreciated and subsequent confusion avoided. But the material upon which Wheeler based his original descriptions was far from adequate. There was a single major worker and five or six minors of *bruesi*, all strays taken by Wheeler at Ft. Davis, Texas. In addition to these types Wheeler had six more minor workers coming from two stations in Mexico. The paucity of type material was even more acute in the case of *ulcerosus*. This species was described from a single major worker taken by C. Shaeffer at Palmerlee in the Huachuca Mountains of Arizona.

In both of Wheeler's species the major worker possessed a striking, oblique truncation at the front of the head. But in the type of *ulcerosus* each cheek bore a large, deep, ulcer-like depression. The outer edge of each depression was bounded by a ridge along the lateral border of the head. Its inner edge lay close to the clypeus and the frontal lobe. These depressions, the clypeus and the frontal lobes were covered with very coarse, uneven, irregular rugae. In contrast, the type of the major worker of *bruesi* showed no depressions on the cheeks. The truncated anterior part of the head formed an almost flat plane which rounded into the lateral borders of the head through a blunt angle. The cheeks, clypeus and frontal lobes were coarsely but unevenly punctato-rugose (Text-fig. 3). It is not surprising that Wheeler considered these very different insects as distinct species or that Emery should later have placed them in separate subgenera. With nothing more than the structure of the types for a guide, this procedure required no justification. The accumulation of additional material of *ulcerosus* and *bruesi* was slow. Wheeler took two colonies of *ulcerosus* containing both major and minor workers in the Huachuca Mountains after he had described that species but before the paper carrying the description was printed. This material, which was referred to in a footnote, seems never to have been mounted for study. I believe that it must have been subsequently lost for I have never seen any of it in the collections which I have examined. It was not until nine

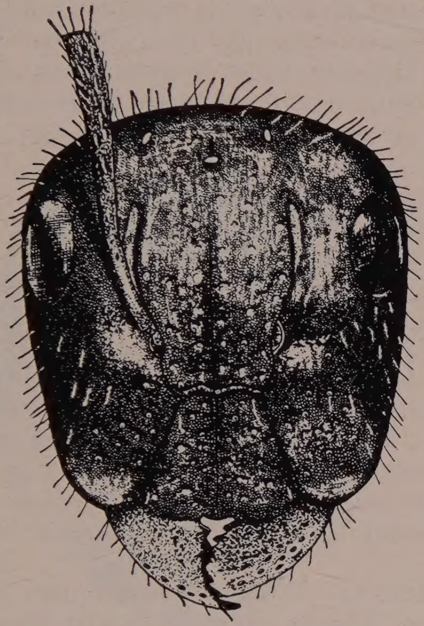


Text-fig. 1. *Camponotus* (*Myrmaphaenus*) *ulcerosus* Wheeler, head of major worker with fully developed ulcers.

years later that additional material of *ulcerosus* came into Wheeler's hands. In March 1919 he collected, at Oracle, Arizona, a small nest of *ulcerosus* containing both major and minor workers. Two years later Wheeler set up the subgenus *Manniella* (2) but he did not assign *ulcerosus* to it. This transfer was made in 1925 by Emery (3) who placed *bruesi* in the subgenus *Myrmaphaenus* at this same time. Emery's treatment has been followed by students of North American ants to the present, although in my 1950 publication (4) I expressed doubts that *ulcerosus* could properly be included in the subgenus *Manniella*.

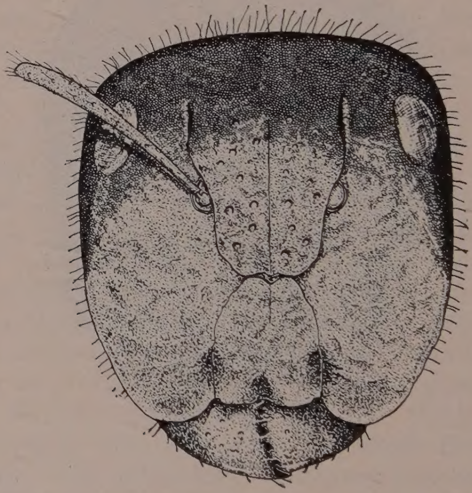
A fixed idea often has an extraordinarily tenacious hold. When I collected six colonies of this ant in Garden Canyon in 1950 I still attempted to assign them either to *ulcerosus* or to *bruesi*. I had studied these colonies in the field as carefully as I could. I had examined a considerable proportion of each under a small binocular microscope. I knew that the four females which had been taken with them were all extremely similar and not at all like the major workers with which they had been secured. I knew that in every case the structure of the nest was the same. Yet it was not until I mounted up this material and studied it in detail that I realized that *ulcerosus* and *bruesi* are the same insect. Since others may have equal difficulty in believing that two such dissimilar major workers can belong to the same species, I have presented here the steps by which this conclusion was reached. The altogether unexpected structure of the female may be considered first. Except for very minor details of color, pilosity, and sculpture all four females are identical. Only their cephalic structure need be considered at this point. The front of the head of the female shows nothing comparable to the oblique truncation of the major. The clypeus and the cheeks are, perhaps, a trifle flatter than is usual but, in general, the head of the female shows the customary, convex curvature found in many species of *Camponotus* (Text-fig. 2). The cheeks show no sign whatever of ulceration. The sculpture of the clypeus, frontal lobes and cheeks consists of moderately coarse, oval or rounded punctures which are irregularly spaced. The surface between these punctures is finely and densely granulose.

Between some of the punctures it is thrown up into a low mound. There are no rugae on the front of the head unless one chooses to regard the mounds just mentioned in this light. As may be seen the head of the female does not resemble that of the major of *bruesi* and still less that of the major of *ulcerosus*. There is, however, a very close resemblance between the head of the female and that of the larger media workers which were taken with them.



Text-fig. 2. *Camponotus (Myrmaphaenus) ulcerosus* Wheeler, head of female. Scale as in text-fig. 1.

We may now consider the structure of the major workers taken with these females. The first female to be secured came from a colony which had been scattered by improper collecting methods. Only two majors were taken in this case. Both are transitional in the degree of development of the ulcers on their cheeks. That is to say, the ulcers are much shallower than those of the type of *ulcerosus* but still clearly recognizable as ulcers. The second female was taken in association with six major workers. Of these one had moderately prominent ulcers on the cheeks, three had shallow ulcers on the cheeks, one had small and very feeble ulcers and one was non-ulcerate. The two remaining females came from the same colony. In this colony were seven major workers. Three of these have a cephalic structure far more extreme than that of the type of *ulcerosus*. The ulcers on the cheeks of these fantastic insects are so deep that the bottom of the depression must be almost in contact with the gula. Each depression extends clear to the lateral border of the head, where it is bounded on the outside by a thin, vertical sheet of chitin. The sculpture of the depressions, the clypeus and the frontal lobes is extraordinarily rough and uneven, so much so that these parts have a peculiar shrivelled or crumpled appearance (Text-fig. 1). The remaining four majors belonging to this colony closely approximate the condition found in the type of *ulcerosus*. There may be added here the cephalic characteristics of the majors taken



Text-fig. 3. *Camponotus* (*Myrmaphaenus*) *ulcerosus* Wheeler, head of non-ulcerate major worker. The head has been tilted backwards slightly to show the anterior truncation as fully as possible. Scale as in text-fig.1.

from colonies in which the female was not secured. Only one of these three colonies represented the majority of the nest. In this colony there were ten majors. Three of these majors have no trace of ulcers on the cheeks. Six of them have very shallow ulcers which are, nevertheless, covered with very coarse rugae. These rugae tend to obscure the ulcers but each depression has a low, distinct, lateral ridge which bounds its outer edge. One major worker in the above colony has somewhat deeper ulcers, although they are not as deep as those of the type of *ulcerosus*. Both the remaining colonies were fragments of nests in which the passages were lost during the course of excavation. The first contained two non-ulcerate majors. The second contained two majors with shallow ulcers having rather feeble rugae.

The facts just presented permit the following statements concerning this insect:

1. The female of this species is normal in every respect and there is no correlation between the cephalic structure of the female and that of the major worker.
2. The same type of female may produce widely different sorts of major workers.
3. The range of variation in the head of the major worker extends well beyond the condition found in the type of *ulcerosus*, which stands about midway in the series of transitional forms.
4. The full range of variation in the cephalic structure of the major is seldom, if ever, present in a single nest series. But in every nest series there is sufficient variation in the head of the major to make ulceration useless as a separatory character.
5. The non-ulcerate majors always have low and comparatively obscure rugae on their cheeks. Those with shallow ulcers may have the rugae either feebly developed or coarse and prominent. The majors with very deep ulcers invariably have extremely coarse rugae on the front of the head. Cephalic sculpture, like the ulceration of the cheeks, cannot be used as a separatory character.

There is but one conclusion to be drawn from the above data: *ulcerosus* and *bruesi* are the same insect. The most immediate effect resulting from the recognition of this fact involves the choice of the valid name. Either name is available since both appeared in the same publication. It has been the practice of myrmecologists to use page precedence in deciding cases of this sort. In this instance the name *bruesi* has page precedence but I have selected *ulcerosus* as the valid name for two reasons. In the first place the fully ulcerate major worker of this ant is a most extraordinary insect and it seems well to retain a name which refers to this striking peculiarity even though it is not shown by all the major workers. In the second place the type locality of *ulcerosus* is in the Huachuca Mountains of Arizona. Since this ant appears to be much more abundant in the Huachucas than at Ft. Davis, Texas (the type locality of *bruesi*) it is advantageous to have the Huachuca Mountains as the type locality.

It would be gratifying if the subgeneric affinities of this insect could be as easily handled as can the choice of its specific name. Since *bruesi* was assigned to *Myrmaphaenus* and *ulcerosus* to *Manniella*, the inconsistency of a species split between two subgenera cannot be allowed to stand. The problem is to rectify this inconsistency with the least damage to the subgenera involved. In a previous publication (4) I have shown that the constitution of *Myrmaphaenus* is unusually heterogeneous. This is entirely due to Emery who, without giving any valid reason for the change, reversed his earlier views in 1925 and combined in one group species which he had formerly assigned to three subgenera. This circumstance makes it impossible to select a clearly definitive character by which all the species belonging to *Myrmaphaenus* may be recognized. But it may be stated that there are some species in *Myrmaphaenus* that have a major worker in which the front of the head is obliquely truncated. There are some species in which the worker caste is polymorphic. There are some species known to have a normal female. If, therefore, we are dealing with a species which combines these three features, its inclusion in *Myrmaphaenus* causes no increase in heterogeneity on any of the above counts. As to whether this species shows the 'subgeneric characteristic' of *Myrmaphaenus* is not the question for, as things stand at present, there is no uniformly applicable characteristic which will define the members of this ill-conceived and conglomerate subgenus.

The situation in the subgenus *Manniella* is simpler, but this is mainly because it contains a much smaller number of species than *Myrmaphaenus*. For this subgenus is also cursed with heterogeneity. When *Manniella* was first set up by Wheeler in 1921 it contained only the Cuban species *sphaericus* and its subspecies *sphaeralis*. This species had previously been assigned to *Colobopsis* by some workers and to the subgenus *Myrmeurynota* by others. Wheeler's move was a sound one, for it recognized the peculiar structural features which mark the major worker of this species. The major worker of *sphaericus* possesses ulcerate cheeks and peculiarly modified frontal lobes. Each frontal lobe is large, laterally expanded and with its anterior half distinctly concave. The two concavities are separated by a prominent median septum where the lobes join. While this configuration of the frontal lobes may be nothing more than the specific characteristic of *sphaericus* it seems to have no close counterpart in any other species in the genus *Camponotus*. Hence the subgenus *Manniella* can if necessary, be based upon the unique structure of the frontal lobes of *sphaericus* as long as the subgenus is limited to that species. With this auspicious start it is most unfortunate that Emery and Wheeler should have subsequently added to *Manniella* species which do not agree in the characteristics just mentioned. In 1925 Emery transferred *ulcerosus* to *Manniella* and in 1934 Wheeler placed *linnaei* and *championi* in this subgenus (5). Each of the species transferred to *Manniella* has a major worker with ulcerate cheeks but none of them has frontal lobes comparable to those of *sphaericus*. Emery was clearly aware of this discrepancy, for he commented on it when he transferred *ulcerosus* to *Manniella*. No doubt Wheeler was also, but by 1934 the structure of the frontal lobes had been subordinated to the presence of ulcers on the cheeks as the definitive characteristic of the subgenus *Manniella*. It is instructive to note that both Emery and Wheeler tried to bolster this character with others which would give a better definition to *Manniella*. Thus Emery postulated that the worker caste in *Manniella* is strictly dimorphic and Wheeler later added the concept that there is no normal, winged female in this subgenus, her place being taken by a fertile major worker. The point in these distinctions is that they give a certain degree of separation from *Myrmaphaenus,* where at least some of the species are known to possess a polymorphic worker caste and a normal winged female.

It should be clear that the data presented in this paper destroys the subgenus *Manniella* as defined by Emery in 1925 and emended by Wheeler in 1934. For, if *ulcerosus* is retained in *Manniella,* as is quite possible since some of its major workers are far more heavily ulcerated than those of any other species in the subgenus, then it follows that *Manniella* must be expanded to include a species with a polymorphic worker caste and a normal female. Conversely if *ulcerosus* is transferred to *Myrmaphaenus,* where it fits on every count except the ulcerate major, then this same ulcerate major breaks down the one certain distinction between the two subgenera. It may be argued that the transitional character of *ulcerosus* defeats any attempt to separate *Myrmaphaenus* and *Manniella* and this is true as long as the separation is based on the presence or absence of ulcers on the cheeks of the major worker. But, as I have already pointed out, the separation need not be made on this basis. If the definitive subgeneric characteristic of *Manniella* is made the configuration of the frontal lobes of the major and not the ulceration of its cheeks, then a good separation can be secured. It is true that this procedure limits the representation in *Manniella* to the species *sphaericus* and that *ulcerosus, linnaei* and *championi* must be shifted to *Myrmaphaenus* as a result. But this transfer can do no damage to a subgenus whose constitution is already a monument of heterogeneity. Moreover, this method seems to be the only one which will preserve *Manniella.* I believe that there is a distinct advantage in maintaining *Manniella,* for *sphaericus* is a very singular species and if *Manniella* is fused with *Myrmaphaenus* there is every reason to expect that it will have to be resuscitated at a later date. I also feel fairly sure that it will be necessary in the future to set up a new subgenus to receive *ulcerosus.* I have not done so at present because of the possibility that *ulcerosus* may fit into one of the subgenera which Emery fused to make *Myrmaphaenus*. Since it is clear that *Myrmaphaenus* will have to be drastically revised if its constituent species are to be put on a sound taxonomic basis, any piecemeal attempt in this direction would be premature. One may earnestly hope that the next revisionary effort applied to *Myrmaphaenus* will be thorough enough to give us a workable version of this highly unsatisfactory group. In the meantime the plan which causes the least disarrangement is to transfer to *Myrmaphaenus* the species *ulcerosus, linnaei* and *championi* and to restrict the subgenus *Manniella* to *sphaericus* and its subspecies *sphaeralis*. I propose to follow this plan and trust that other myrmecologists will see the matter in the same light.

I wish to present here certain descriptive details to augment the figures of *ulcerosus* included in this paper. These will be restricted to the minor and media workers and the female. Both the ulcerate and the non-ulcerate phases of the major worker of this insect have been described elsewhere and need no further description here.

Worker minor: head (exclusive of the mandibles) 1.25 mm. long; thorax and petiole 2 mm. long; total length 5.5-6.5 mm. Erect hairs long, thin, white and usually with sharp tips; abundant on the rear of the head, the entire thorax and the abdomen. Hairs on the mandibles, clypeus, cheeks and gula for the most part notably shorter than those on the rear of the head. Femora with short erect hairs on their lateral and flexor surfaces. Those on the extensor surface mostly appressed and often largely limited to the outer half of the femur. Tibiae with abundant erect hairs. Those of the tarsi and antennal funiculi finer, shorter and semierect. Antennal scapes covered with very fine, appressed, yellow pubescence and with a few short, yellow, semierect hairs usually present on the outer half of each segment. Head and thorax finely and densely granulose (under high magnification this granulation may be seen to consist of close-packed, circular craters). Coxae and petiole with a delicate, even, reticulate sculpture. Gaster finely shagreened, somewhat more shining than the coxae and the petiole. Mandibles with elongate, oval punctures. A few feeble, coarse punctures are present on the clypeus and the cheeks. In some specimens these are so shallow that they can only be seen in oblique lights. Color black, the mandibles, antennae and tarsal joints light brown. The anterior edge of the clypeus and the area immediately behind the insertion of the mandibles often marked with brown. In many specimens the abdomen, and to a lesser extent the thorax, will show bluish reflections.

Worker media: head (mandibles excluded) 1.75 mm. long; thorax and petiole 2.5 mm. long; total length 6-7 mm. Pilosity as in the minor worker. Sculpture of the thorax and abdomen as in the minor worker. The head is a little more strongly granulose and less shining with numerous, conspicuous, oval punctures on the clypeus and cheeks and a few feebler punctures on the frontal lobes. Most of the clypeus, the anterior portion of the cheeks and the anterior half of the frontal lobes light brown. The color otherwise as in the minor worker.

Female: head (mandible excluded) 2 mm. long; thorax and petiole 4 mm. long; total length 9-10 mm. Erect hairs on the thorax sparser and a little shorter than those of the worker castes. Erect hairs elsewhere very similar to those of the worker. Sculpture of the head similar to that of the media worker but with the punctures more pronounced, particularly on the frontal lobes where they extend rearward to the level of the median ocellus. Scutum densely and evenly granulose, feebly shining with scattered, irregular punctures from which the erect hairs arise. The remainder of the thorax more strongly shining, particularly the lateral portions of the pronotum, the metanotum, the basal face of the epinotum and the mesothoracic sternite and episternite. On the above areas the granulation is reduced to a delicate and minute reticulate sculpture. Gastric sculpture heavier than in the media, particularly on the dorsum of the first gastric segment where the sculpture consists of a minute pattern of reticulations. Front of the head usually marked with brown as in the media but sometimes the entire head, except the mandibles and antennae, is black. The four females examined showed no bluish reflections on the gaster or thorax.

The above descriptions, as well as the figures were based upon material taken in Garden Canyon in the Huachuca Mountains of Arizonia. Garden Canyon, therefore, becomes the type locality for the female and media worker. In this connection it seems well to note that there is no good agreement as to the exact situation of Palmerlee, the type locality of the major of *ulcerosus*. I regret that this name was incorrectly spelled as "Parmerlee" in my 1950 publication on North American ants, for this adds further confusion to an already confusing situation. Mr. L. F. Byars, who is much interested in Arizona ants, writes me that the former postoffice of Palmerlee was situated on the Palmer Ranch at the mouth of Miller Canyon. But Will C. Barnes in his entertaining publication *Arizona Place Names*, (6) states that Palmerlee was at the Reef Mine on Miller Creek and that J. L. Palmerlee, on whose land the postoffice was established in 1904, was its first postmaster. Mr. Barnes secured his data from the records of the United States Post Office, hence the date and the postmastership appear beyond dispute. But it is very unlikely that the postoffice was at the Reef Mine. For the Reef Mine is now situated, and apparently has always been situated, at an elevation of 6700 feet near the head of Carr Canyon. This area is well above the ordinary vertical range of *ulcerosus*. The contradictions just discussed need occasion no difficulty if one is content to cite the Huachuca Mountains as the type locality for *ulcerosus*.

Since virtually nothing has been published on the habits of *ulcerosus*. I wish to present certain data which were secured last summer. The observations which follow were made in an area near the picnic grounds in Garden Canyon. At this level the canyon is divided by a low ridge into two roughly parallel valleys. The road to the picnic grounds runs through the larger valley which lies to the southeast of the ridge. This valley is clearly the better watered of the two, for it contains big sycamores and junipers along the stream bed. These are absent in the smaller valley which lies on the northwestern side of the ridge. The dividing ridge has many shrubby live oaks on its southeastern slope. These are very abundant at the base of the ridge but thin out toward its crest. A few oaks cross the crest of the ridge into the smaller valley but most of this valley, particularly its slope which faces southeast, is dominated by numerous plants of *Agave palmeri*. As the agave plants are much less abundant in the larger valley, the two sides of the ridge present a very different appearance. Despite this striking vegetational difference the two areas are part of the same plant association. Shreve has pointed out (7) that in the southern Arizona mountains the evergreen oak forest is an open community with many other plants present, among them *Agave palmeri*. Shreve's view is fully supported as far as the ants in this area are concerned, for the same ants occur in the dense oak thickets and on the open slopes where the agave plants grow. In both these areas the soil is very stony, with many of the stones partly projecting above the surface. The nests of *ulcerosus* are usually situated under such partially buried stones.

Considering the abundance of the foraging workers, the nests of *ulcerosus* are extraordinarily difficult to find. Mr. Luther Little, who was camping with us, first called my attention to the workers of *ulcerosus* on the agave leaves. So many of the plants were visited by foraging workers that I thought that there would be little trouble in tracing them to their nests. Most ants readily accept termites offered to them and carry them at once to their nests. I repeatedly offered termites to the workers of *ulcerosus* which they accepted readily enough. But, instead of taking them home, they usually sucked the juices from the termite and remained on the agave leaf. In a few instances a worker would start home with the termite, but nothing came of this for the ant would soon drop the termite and return to the agave leaf. Although the slope of the canyon was covered with agave plants in all stages of development, the ants chose only those plants which had recently bloomed. Young plants were never visited, nor were the shrivelled remains of plants which had bloomed in previous seasons. The heavy panicle of fruit, towering ten to twelve feet above the leaves seemed the part most likely to attract the foragers. But the ants rarely ascended the fruit stalk. Instead they confined themselves largely to the upper surface of the leaves. The areas around the bases of the lateral spines and particularly the area at the base of the long terminal spine seemed especially attractive. A worker would often stand for many minutes at the base of the terminal spine, apparently licking some substance from the surface of the leaf. The explanation which best fits this behavior is the assumption that, during the fruiting period, the leaves of the agave give off a sugary substance which attracts the ants. This secretion cannot be produced by the younger plants as otherwise they would also be visited by the *ulcerosus* workers.

Since feeding methods had failed to reveal a nest, it seemed advisable to examine the soil in the immediate vicinity of the agave plants in the hope of finding colonies there. The difficulty was to get at the soil immediately beneath the plant. Any one who attempts to uproot a full-grown plant of *Agave palmeri* will soon have a healthy respect for the needle-sharp terminal spines. To get close to the roots of the plant it was necessary to 'dehorn' all the leaves on one side with a pocket knife. The plant could then be wrenched out of the ground with a pick. But the violence of this operation defeated the purpose for which it was intended. Tearing the roots out of the ground disturbed a considerable area of soil and badly displaced the stones in it. The result was to obliterate any nest passages present. The one fragment of an *ulcerosus* colony which was exposed in this fashion was so badly scattered through the soil that, for reasons already explained, I doubted that the female was that of *ulcerosus*. It then occurred to me, as should have been obvious sooner, that if this species customarily nests under agave plants, the nest should be present for at least a while after the plant has died. There were many dozens of dead agave plants on the side of the canyon. These consisted of a rosette of dried and shrivelled leaves with a central hole where the fruit stalk had been. The whole thing was comparatively light and easily handled. With a little care it could be lifted entire and tossed to one side without disturbing the ground beneath. I removed a considerable number of these old plants and examined the soil beneath them. In no case did I find a nest of *ulcerosus.* But in fully half the cases the plant surmounted a flourishing colony of *Pheidole vaslitti arizonica.*

By this time I was convinced that *ulcerosus* does not usually found its nests beneath agave plants but as to where to look for them I had no idea. Then, largely through luck, I stumbled on five colonies. Three of these were situated in open areas on the agave slope but at some distance from the nearest agave plant. The other two were placed at the edge of oak thickets on the opposite side of the ridge. In every case the nest was situated on a slope that faced southeast . I was able to excavate three of these nests completely. I might have done so with the other two had I not lost contact with the passages through over-hasty excavation. Each nest consisted of a rather obscure entrance between stones which were embedded in the soil. In two cases there was a thin disc of excavated soil spread around the entrance but this was not present in the other nests. From the entrance a single, tortuous passage twisted through the soil between and under stones at a depth which was seldom more than six inches below the surface. At intervals, usually beneath the lower surface of a stone, the passage widened into a small, irregular chamber. In each of these were major, media and minor workers and some brood. The queen was usually taken in the last chamber at the inner end of the nest. As there was no telling which direction the passage would take, the soil had to be removed a bit at a time to avoid losing the passage altogether. However, the absence of any lateral passages considerably simplified matters. Because the excavation had to be made slowly, there was ample opportunity to secure foraging workers as they returned to the nest. I believe, therefore, that the figures for the three colonies given below represent most of the population in each case. In the first colony there were one hun-

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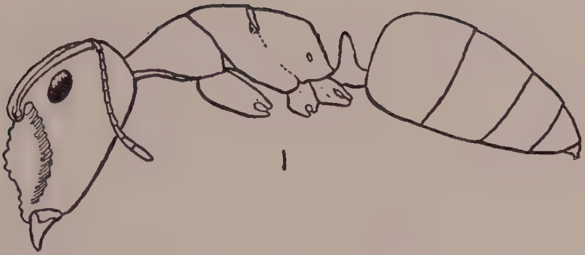
EXPLANATION OF PLATE 5

Camponotus (Myrmaphaenus) ulcerosus Wheeler, Fig. 1. Ulcerate major worker. Fig. 2. Media worker. Fig. 3. Minor worker. Fig. 4. Female. Fig. 5. Non-ulcerate major worker. All figures to the same scale.



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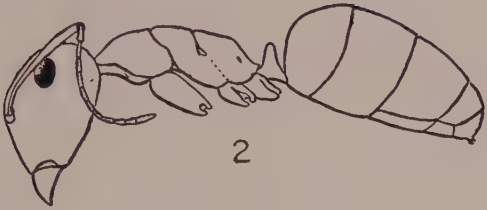

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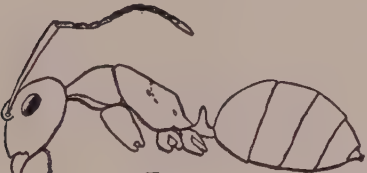

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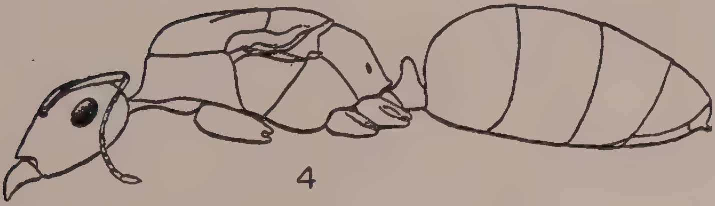

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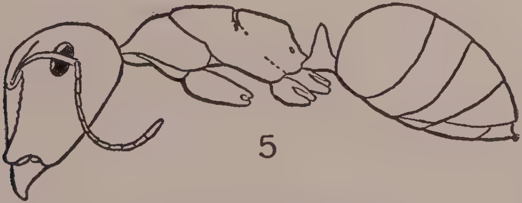

5

CREIGHTON — ARIZONA ANTS

dred and sixty-five minors and medias, six majors and one female. In the second colony there were sixty-four minors and medias, seven majors and two females. In the third colony there were one hundred and thirty-four minors and medias and ten majors. Unfortunately the female of this nest escaped capture. From the above it would appear that the colonies of *ulcerosus* are small, even when more than one female is present. It is also worth noting that all the brood taken in the three nests was in a fairly young condition. No pupae were found and, since the last nest was taken on July 27th, it seems safe to conclude that the marriage flight of *ulcerosus* must occur at the end of the summer or in the early fall.

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CONCERNING SOME *HYDROMETRA* FROM AFRICA (HEMIPTERA)[1]

By H. B. Hungerford
University of Kansas

In the Annales Musei Nationalis Hungarici, Vol. XXVIII, 1934, there appeared an article entitled "The Hydrometridae of the Hungarian National Museum and other studies in the Family" by Hungerford and Evans. This paper contains drawings of most of the known species and keys for the separation of all of the species of the world known to the authors. Twenty-five of the sixty-six *Hydrometra* treated are described as new. Unfortunately there occurred a lapse of several years between the completion of the manuscript and its publication and in the interim three papers describing new *Hydrometra* appeared. However, only *H. ugandae* Jaczewski is from Africa. Since 1934 six more African species have been described, five of them by Poisson and one by Hoberlandt, and some specimens have been received by me for study, including two undescribed species.

I am indebted to my friends Dr. J. C. Bradley and Dr. F. X. Williams for the opportunity to study the *Hydrometra* taken by them during their recent trips in Africa. Dr. Bradley's material was sent to Cornell where Henry Dietrich was kind enough to forward it to me. Dr. Williams' material was promptly forwarded by Dr. Bequaert from the Museum of Comparative Zoology at Harvard and we have mounted and labeled this material to avoid any delay in its study.

In the material collected by Dr. J. C. Bradley are the following:

Hydrometra albolineolata Reuter

Tonga, Sudan, Oct. 28, 1948, White Nile, lat. 9°-28′ N., long. 31°-2′, J. C. Bradley, 1 ♂, 3 ♀ ♀ (Cornell); 1 ♂, 1 ♀ (F. H. Snow Coll.).

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[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

Malakal, Sudan, Oct. 27, 1948, J. C. Bradley, 1 ♂, 3 ♀♀ (Cornell).

Steamer on White Nile, Sudan, Oct. 26, 1948, lat. 10°-45′ N to 10°-26′ N, J. C. Bradley, 1 ♀ (Cornell).

Bahr el Jebel, Sudan, Nov. 3, 1948, Terakeka to Mongalla to lat. 5°-11′ N, J. C. Bradley, 1 ♀ (Cornell).

Hydrometra sp.

Bahr el Jebel, Sudan, Nov. 3, 1948, J. C. Bradley, Terakeka to Mongalla to lat. 5°-11′ N. (1 ♀). (Not but near *H. gracilenta* Horv.)

Dr. F. X. Williams sent the following four species, one of which is new:

Hydrometra africana H. & E.

Africa, Amani, Tanganyika Terr., Feb. 1948, F. X. Williams, 2 ♂♂, 1 ♀ (Mus. Comp. Zool., Harvard); 1 ♂, 1 ♀ (F. H. Snow Coll.). In these specimens the males have the large hair tufts on the sides of the first genital segment that were lacking in the type. The females have two hair tufts on rear margin of last dorsal abdominal segment that are partly effaced on the allotype but present on a paratype.

Hydrometra ugandae Jaczewski

Africa, Uganda, Kichwamba, Feb. 28, 1948, F. .X. Williams, 1 ♂ (Mus. Comp. Zool., Harvard); 1 ♂ (F. H. Snow Coll.).

Hydrometra chopardi Poisson

Africa, Kenya Col., 28 miles N. of Nairobi, Thika River Falls, Feb. 20, 1948, F. X. Williams, 4 ♂♂, 6 ♀♀ (Mus. Comp. Zool., Harvard); 1 ♂, 1 ♀ (F. H. Snow Coll.).

Hydrometra poissoni n. sp.

Size and color: Length 9.24 mm. to 9.54 mm. (males). The general color is dark brown. The head nearly black with a faint longitudinal frosted line on the postocular space; the pronotum with a narrow longitudinal median frosted line bordered successively on each side by a dark, nearly black, purplish-brown band, a brown band, another dark purplish-brown band, outside of which is a frosted line; the hemelytra have two longitudinal white lines, one slender near the costal margin and the other a broader median band which arises from it near its base. Both bands are broken by the dark veins that cross them. There is a streak of white on the hemelytra paralleling the sides of the scutellum. Underside of body somewhat frosted, the sides of the abdomen with a nearly black subconnexival band broken at the segmental junction by frosted spots.

Structural characteristics:

Head: Length 93 units; the ratio of the anteocular part of the head to the postocular part is given by the formula AO : PO :: 57 : 27. The dorsal interocular groove less than the diameter of the eye. The clypeus is quadrate, medianly depressed and slightly emarginate in front, its median length about three fifths its width, the rostrum surpassing two thirds of the postocular distance. The antennal segments: 1 : 2 : 3 : 4 :: 18 : 34 : 77 : X.†

Pronotum: Length 46 units*; the pitting very faint, almost indiscernible, only the curved row of pits behind the anterior acetabulum plainly marked.

Coxae: The distance between the first and second coxae is to that between the second and third as 34 : 62. The anterior acetabulum has a faint pit on each side of the cleft. The middle acetabulum with two faint pits on each side of the cleft; the posterior acetabulum is unpitted on the sides but faintly pitted above.

Femora: The anterior femora surpass the base of the antennal tubercles. The hind femora reach the tip of the abdomen.

Abdomen: The last abdominal segment and the first genital of the male without hair tufts or spines. The first genital segment ventro-laterally depressed, leaving a broad midventral longitudinal keel with some hairs on either side. Seen from above, the first genital segment is broadest about the middle; the terminal dorsal process is stout, slightly upturned and less than one third the length of the segment.

Comparative notes: This species is near *H. smithi* H & E., described from Sierra Leone, but both the shape of the ter-

† last segment missing.

* unit = .033 mm.

minal segments of the males and the color patterns are different. *H. smithi* has a more slender genital segment as seen from above and parallel longitudinal white bands on the last abdominal and genital segments. These are lacking in *H. poissoni.*

Described from two males labeled "Africa, Uganda, 60 miles west of Kampala, March 4, 1948, F. X. Williams," Holotype in the Museum of Comparative Zoology (No. 28493) at Harvard, the paratype in the F. H. Snow Collection. Named in honor of Dr. Raymond Poisson who has described several *Hydrometra* from Africa.

Hydrometra albolineolata Reuter

While the Hungerford and Evans paper of 1934 was in press, Dr. Jaczewski published his "Notes on the Aquatic Heteroptera of the Ethiopian Region"[2] in which he redescribed *H. albolineolata* Reuter and described as new a species which he called *Hydrometra ugandae.*

His conception of Reuter's species was based upon a male specimen from "Addah, Guinea," loaned to him by Dr. Horvath of the Museum in Budapest and presumably a syntype. However, I had previously studied the entire series of specimens in Budapest, two syntypes in the Museum at Perth, Scotland, and one in the U. S. National Museum at Washington, D. C., and my conception of the species (which differs from that of Dr. Jaczewski) is given on page 50 and Plate II of our 1934 paper.

Being puzzled by the difference in concept concerning this species, I have studied the question again and reexamined material which forces me to conclude that my conception of Reuter's species is the correct one. I am therefore selecting a male syntype that corresponds to the figures on Plate II of the Annales Musei Nationalis Hungarici XXVIII, page 48, as the lectoholotype.

I have examined a pair of specimens determined as *H. albolineolata* by Dr. Jaczewski and the male labeled "Zanzibar, H. J. Snell" runs to *H. africana* H. & E. The female from "Uganda, Kampala, G. L. R. Hancock" is not quite the same.

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[2] Stylops, Vol. 1, Part 5, pp. 100-104, 1932.

Hydrometra ugandae Jaczewski

This species was described from Uganda: Bugomolo. The large brush of semi-erect brown hairs on the basal portion of the seventh abdominal tergite of the female and the short somewhat downward curving terminal spine makes the female readily distinguishable. I have examined the female paratype. Dr. China made a drawing of the male type in the British Museum and this drawing shows spiny tufts present on the last abdominal segment although Dr. Jaczewski's description says they are not present.

Hydrometra goodi n. sp.

Size and Color: Length 12.15 mm. (♂) - 12.96 mm. (♀). General color brown, the abdominal tergites, except the last one, shining, nearly black and contrasting with the much lighter connexivum. The pronotum with a narrow longitudinal median frosted line bordered successively on each side by a purplish-brown band, a brown band, another purplish band, outside of which is a curved frosted line above the anterior acetabula and another bordering the margin of the posterior lobe and continuing to the posterior acetabula. Under side of body somewhat frosted. Above, the connexivum has a small frosted spot at the segmental junctions. The last abdominal segment and genital segment covered with short hairs in both sexes.

Structural characteristics:

Head: Length 140 units; the ratio of the anteocular part of the head to the postocular part is given by the formula AO : PO :: 88 : 41. The dorsal interocular groove less than the diameter of the eye, the ventral interocular groove also short. The clypeus is quadrate, truncate in front, its median length slightly more than half its width, the rostrum surpassing two thirds of the postocular distance The antennal segments: 1 : 2 : 3 : 4 :: 27 : 56 : 130? : X (♂); 1 : 2 : 3 : 4 :: 25 : 58 : 135 : 65 (♀).

Pronotum: Length 60 units; pitting indefinite.

Hemelytra: Short, 90 units long, covering the first abdominal segment, surface uneven, veins conspicuous.

Coxae: The distance between the first and second coxae is to that between the second and third as 40 : 70. The anterior and middle acetabula have two pits on each side of the cleft. These are often obscure.

Femora: The anterior femora surpassing the head by half the length of the first antennal segment. The hind femora surpassing the end of the abdomen.

Abdomen: The last abdominal segment of the male without hair tufts. The first genital with hair tufts just laterad of shallow depressions which outline a faint median longitudinal ventral keel. Seen from above, the first genital is broadest at its base, the terminal dorsal process is caudally directed and short, only about one fifth the length of the segment in the male. In the female the terminal process is nearly one third the length of the segment and sharp pointed. The hair tufts on the caudal margin of the last abdominal tergite that are possessed by the females of several species are lacking in this one.

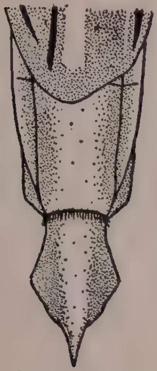
Comparative notes: This new species belongs to the typically African group that includes *H. ambulator* Stål, *H. albolineolata* Reuter, *H. africana* H. & E., *H. trans-*

EXPLANATION OF PLATE 6

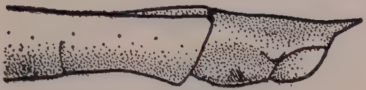
Figs. 1-3. *Hydrometra poissoni* Hungerford. Fig. 1. Dorsal view of last abdominal segments of male. Fig. 2. Lateral view of last abdominal segments of male. Fig. 3. Ventral view of last abdominal segments of male.

Figs. 4-8. *Hydrometra goodi* Hungerford. Fig. 4. Lateral view of last abdominal segments of female. Fig. 5. Lateral view of last abdominal segments of male. Fig. 6. Dorsal view of last abdominal segments of female. Fig. 7. Dorsal view of last abdominal segments of male. Fig. 8. Ventral view of last abdominal segments of male.

(Drawings by Thomasine Neering).



1 H. poissoni ♂



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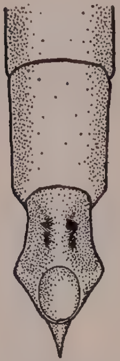
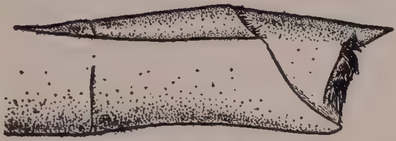
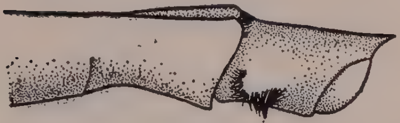


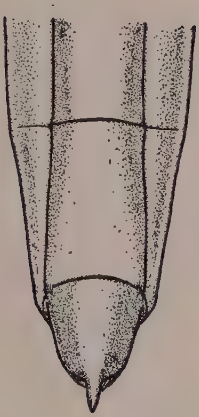
3 H. poissoni ♂



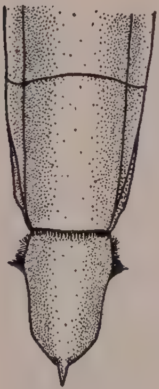
4 H. goodi ♀



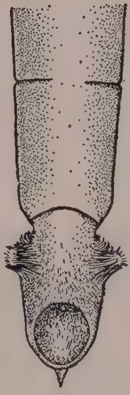
5 H. goodi ♂



6 H. goodi ♀



7 H. goodi ♂



8 H. goodi ♂

HUNGERFORD — AFRICAN HYDROMETRA

vaalensis H. & E., *H. ugandae* Jacz., *H. chopardi* Poisson, and *H. monodi* Poisson. It is more slenderly elongate than any of the above. The first antennal segment is relatively longer, plainly surpassing the head by more than half its length. The head itself is more elongate. It may be most nearly related to *H. ugandae* Jaczewski but the females lack the large brush of hairs on the last dorsal abdominal segment that distinguish *H. ugandae.*

Described from one male (holotype) labeled "Sangmelima, Cameroon, W. Africa, Oct. 17, 1934, A. I. Good," a female (allotype) labelled "Sangmelima, Cameroon, 4-16, 1932, A. I. Good." and two female paratypes, one taken with the holotype and the other with the allotype. These have been in the F. H. Snow Collections under a manuscript name for many years.

A MIGRATING ARMY OF SCIARID LARVAE IN THE PHILIPPINES

By Charles T. Brues
Harvard University

On the morning of June 15, 1949 we witnessed a mass migration of fungus-gnat larvae in the rain-forest zone of Negros Island at an altitude of about 4,000 feet. Close to a temporary shelter in which we were housed, my wife noticed a strange crawling object moving over the wet, muddy soil. Closer examination at once disclosed that this was an irregular, band-like mass of small dipterous maggots such as have been noted from time to time in scattered localities in the holarctic region. Originally known as Heerwürmer in Europe and as snake-worms in the United States, these when reared, have always proved to be members of the genus *Sciara*. *Sciara* is cosmopolitan in distribution and many species are known, but it appears that only a very few ever indulge in migrational processions.

In the present instance, the mass of larvae was moving slowly in a very irregular band about a foot in length, less than an inch in width and layered to a depth of about half an inch. As has been described in some previously observed cases, the individual larvae were moving on the slimy bodies of their fellows so that progression is accomplished by the forward motion of those on the top, while those at the rear, as they are uncovered, move with a sort of superficial, belt-like, rolling motion over the cramped individuals in the lower layers. Thus, the mass moves onward, but the larvae are continually changing position with reference to one another.

It had been raining during the night and the mountain was intermittently in the clouds. The wet soil was marked with numerous foot-prints and with a shallow drainage ditch to guide water away from the shelter, there was thus little opportunity to steer a straight course and the movement was very erratic, although consistently in the general direction of the drier ground under the shelter.

In the course of a few minutes while Mrs. Brues secured some motion pictures of their movements, the swarm had advanced several feet over the irregular terrain. We collected about one-third of the marching larvae and a subsequent count of these indicates that some 900-1200 larvae were taking part in the procession. This total is surprisingly small and far less than a rough estimate made at the time the swarm was observed.

No stragglers were seen in the neighborhood of the crawling swarm in spite of the very irregular surface over which it traveled. The band of larvae was by no means of uniform breadth or thickness, swelling and contracting constantly as movement was speeded or slowed by sudden ups and downs along the path. Even at points where there were very few larvae, those coming up from behind selected without hesitation the slime trail left by those in advance.

As all individuals were fully grown and of uniform size it appears that migration was not undertaken in search of food, but to find suitable conditions for pupation and transformation. We were unable to find any fleshy fungi from which the swarm might have come. In spite of the excessive moisture in the rain forest, large fungi are comparatively scarce, although diffuse mycelial growths are plentiful on the logs, bark and smaller vegetable debris that litter the forest floor. In general the insect fauna of this area is not rich in mycetophageous forms and very few fungus-gnats were present in sweepings made in the vicinity. In common with other Mycetophilidae (in the wider sense) the species of *Sciara* are mycetophagous, developing most generally in decaying mushrooms and in vegetable material such as tubers, large seeds, etc., that are disintegrating through the action of putrefactive bacteria and fungi. Like some of their relatives, the adult midges frequently appear in incredible numbers where such food is available under the moist conditions essential to their larval development.

As would be expected the earlier observations were recorded by European entomologists. These have been referred to in several American publications. Johannsen ('09) states that the European Heerwurm is probably *Sciara thomae* L. or *S. militaris*, probably the latter.

In the United States, a number of observations have been published, dealing with Nearctic species, at least one of which has been reared by Becker ('14) and described by Johannsen ('14) as *Sciara congregata.*

The first references to migrating sciarids in our own country appears to be one by Glover in 1872. Another early record was published by Linter in his tenth report as State Entomologist of New York. Later Riley and Howard ('91) refer to two cases reported by a correspondent who observed two "snake-worms", each some fifteen inches in length and half the diameter of a man's little finger. During the following decade Webster ('94) observed two instances at Lafayette, Indiana, of swarms a foot or two in length and from one-half to two inches in diameter. At about the same time, Jones ('93) saw at Oberlin, Ohio, a "rope of maggots" five feet in length and two inches in diameter. He was unaware of their identity, but shortly afterward Williston ('93) indicated that these were undoubtedly *Sciara* larvae. Felt ('01) described several from parts of New York State, referring to several strings seen on successive days near Franklin, N. Y. These were about fifteen or twenty inches in length. He also summarized a number of previously published observations.

Following the account by Becker, mentioned above, Notman ('21) recorded an interesting case observed by him in eastern New York, applying the term "compound larvae" to the procession.

Finally, after our return to America we found in the recently published book "High Jungle" by William Beebe ('49) an account of a parade of maggots which we surmised to be a migration of *Sciara* larvae in the American tropics. This is verified by the later description of *Sciara* (*Neosciara*) *beebei* by Shaw and Shaw ('50) as the larva in question. Dr. Shaw has kindly identified the Philippine larvae as a species of *Sciara, sens lat.*

It is therefore evident that this migratory habit is more widespread than had previously been supposed.

Beebe's account is the most careful and complete description of the migrating behavior of *Sciara* which has been published. His observations were made at his Rancho Grande laboratory in the Venezuelan Andes.

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TWO NEW SPECIES OF EXOTIC ANTS[1]

By Robert E. Gregg

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The new forms described below were sent to me through the generosity of Dr. William L. Brown, Jr., and belong to the collections of the Museum of Comparative Zoology. I am indebted to Dr. Brown not only for the opportunity of describing and figuring these specimens, but for checking references and for comparing them with related species of ants in the Wheeler Collection.

Stictoponera posteropsis n. sp.

Female. Length, 5.25 mm., cephalic index, .80.

Head, excluding the mandibles, considerably longer than broad, the widest portion about midway between the mandibular insertions and the posterior corners; sides somewhat convex anterior to the eyes. Occipital border deeply and broadly concave, with sharp, upturned margin, and produced at the angles into pronounced occipital lobes which project upward. Clypeus rounded, convex, and with anterior margin entire. Frontal carinae remote, parallel, and possessing well developed lateral lobes covering the insertions of the antennae. Eyes very convex, almost hemispherical, set far back on the head in depressions just anterior to the occipital lobes; ocelli also far posterior on the head. Antennae 12-segmented; scapes long, nearly straight, increasing slightly in diameter toward the tips, and slightly surpassing the occipital lobes. Funiculi not clubbed, but segments gradually increasing in size, the terminal segment equal in length to the two preceding. Mandibles triangular; external border sinuate, basal border convex, and apical or masticatory border without teeth or denticles.

Thorax in profile strongly convex, promesonotal suture, meso-metanotal and the meta-epinotal sutures distinct, de-

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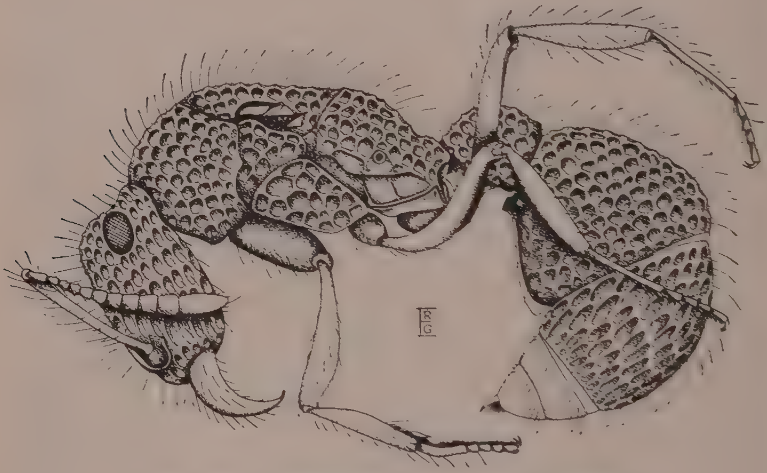
[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

spite the heavy sculpturing of the body. Epinotum with broadly rounded basal face passing abruptly into a deeply concave declivity which partially accommodates the node-like petiole. The declivity is bounded laterally by high, sharp, narrow ridges, each ridge having a very small, blunt epinotal spine, that almost blends with the general sculpture. Petiole subglobose or nodiform, narrower in front, expanding gradually behind, but sharply constricted where it joins the postpetiole or first gastric segment; convex dorsally and concave ventrally, provided with a long, flat, anteriorly projecting, ventral tooth. Postpetiole broad, globose, its ventral surface armed with a long, narrow keel which expands into an open, lip-like structure at the anterior margin and directly beneath the petiole. Remainder of gaster smaller than the postpetiole, and projecting downward and forward, and supplied with a well developed sting.



Text-fig. 1. *Stictoponera posteropsis*, profile.

Wings hyaline, straw-colored, extending beyond the tip of the gaster. One cubital cell, one discal cell, one large and one very small submarginal cell, is each present in the forewing.

Head, dorsal aspect of mandibles, thorax, petiole, postpetiole, and the first segment of the gaster, completely and heavily sculptured with coarse, deep pits or foveolae. The pits are rounded to hexagonal on most of the body, but are elongate and oval on the head and the gastric segment. The sculpture is so coarse that under the microscope the shining surfaces, especially of the ridges between the pits are not diminished, but to the unaided eye, the general body tone is subopaque.

Long, delicate, sharp-pointed hairs cover all parts of the body and appendages, and arise separately from the foveolae where these are present. Pubescence is practically absent on the body, but is abundant on the scapes, funiculi, coxae, legs, and the posterior region of the gaster.

Color reddish brown, with the funiculi, scapes and legs a lighter red; tip of gaster yellowish.

Holotype: winged female (M.C.Z. No. 28556).

This species is described from a single female specimen (worker caste unknown), taken on November 12, 1921 at Wai Lima, Prov. of Lampong, southern Sumatra, by H. H. Karny.

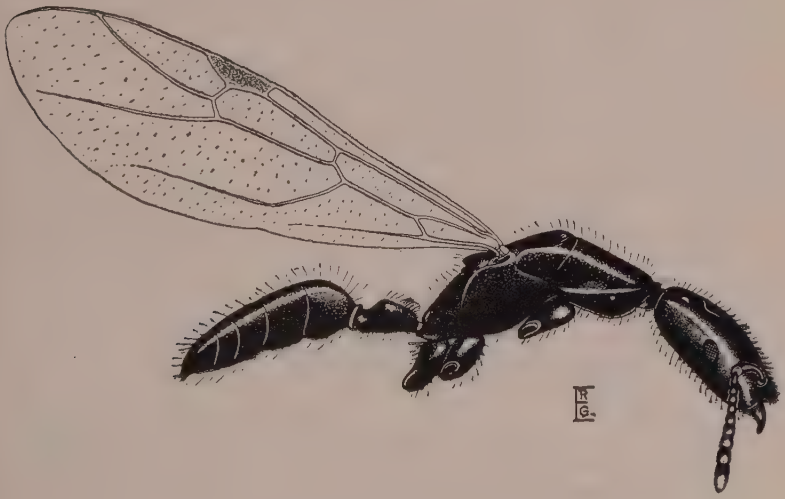
The ant belongs apparently to a rare group, and, according to Dr. Brown, there is only one other specimen in the Wheeler Collection very similar to it, a worker taken by Dr. Chapman in the Philippines. This worker was marked as new by Wheeler, but was left undescribed. The new species finds its place among other *Stictoponera* (namely, *rugosa* (F. Sm.), *coxalis* Rog., *menadensis* Mayr, *bicolor* Em., and *avia* Forel), a group which possesses a low, loaf-shaped or globular petiole. None of these, however, has the eyes so far back on the head as does *posteropsis*, a character which alone will distinguish it from the others. I have seen a specimen of *Stictoponera* bicolor, and two of *S. costata* Sm. (=*Ponera rugosa* F. Sm.?), and upon comparing them with *posteropsis*, have found that the latter differs from them in the following particulars. The eyes are not only placed far posteriorly on the head, but are very convex, whereas in *bicolor* they are much flatter. The antennal scapes reach or project but slightly beyond the occipital corners, though in *bicolor* they exceed the corners by a distance equal to the greatest width of the scape. No teeth are present on the mandibles, but minute denticles are present on those of *costata*; frontal carinae have broad lateral lobes, but this condition is absent in *bicolor*. The humeral angles seem to be less sharp and projecting than in either *costata* or *bicolor*, and the epinotal spines are practically absent, though they might prove to be present on the worker when it is found. The sculpture is similar to that of the other two species, but shows the first gastric segment to have elongate and oval foveolae, whereas on *costata* they resolve themselves into very long grooves running the full length of the segment, and in *bicolor* the sculpturing on this segment is almost completely absent, leaving the surface smooth and shining. The ventral blade on the petiole is rounded while in *costata* its apical edge is notched, and a midventral keel or ridge is present on the postpetiole of *posteropsis*, this structure being absent on the other species. The comparisons made are between a female and the worker caste of the other species, but the differences are sufficiently striking to support the description of a new form. In addition, there are important differences in size; *posteropsis* (♀), is slightly over 3 mm. in length, *costata* (☿), is over 5mm., and *bicolor* (☿), is over 5 mm. Although these ants are ponerines, undoubtedly, the worker of *posteropsis*, if known, would prove to be considerably less than 3 mm. long.

Camponotus (Myrmostenus) cooperi n. sp.

Female. Length 6.25 mm., cephalic index, .55

Head, excluding the mandibles elongate, as indicated by the head index; rectangular in general shape, the widest point at the anterior angles where the mandibles articulate. Occipital angles abrupt, and posterior margin straight. Sides of head slightly concave, with the eyes medium sized and almost flat, located midway between the anterior and posterior ends. Ocelli about midway between the eyes and posterior border of the head. Clypeus convex, and produced anteriorly into a cone-like process. Frontal carinae low and indistinct, leaving the antennal insertions exposed. Antennae 12-segmented, scapes short, extending posteriorly only as far as the eyes; narrow at the base and expanding abruptly toward the apex. Funculi gradually increasing toward the tips, the last three segments considerably enlarged, and each longer than broad, but not forming a club. Mandibles narrow, each with three apical teeth and one indistinct denticle.

Thorax long and narrow, gradually widening to the insertions of the forewings and tapering posteriorly from that point. Prothorax from above long and somewhat resembling a truncated isosceles triangle; mesothorax about as wide as long. Thorax in profile convex; pronotum flat but sloping upward to the mesonotum which is angled just behind the promesonotal suture; scutellum raised. Sides of thorax flat. Epinotum without distinct basal and declivious faces, the entire dorsum sloping away rapidly from the metanotum to the articulation with the petiole. Petiole convex, low in front and rising gradually to a low broad node (no scale), whose posterior slope is concave; ventral surface smooth. From above, the petiole is rounded and almost oval in shape, though narrower in front and widening gradually to the apex of the node.



Text-fig. 2. *Camponotus* (*M.*) *cooperi*, profile.

Gaster long, narrow, flat above, modified elliptical in shape, widest in the middle of the first segment, and tapering to a pointed posterior end. Entire body notably elongated and depressed.

All surfaces glabrous, very smooth and shining, the only indication of sculpture being the minute pits from which the hairs arise and a slight shagreening of the gaster. Hairs delicate, pointed, pale yellow, and present on the head, thorax, petiole, gaster, scapes, funiculi, and all segments of the legs. Pubescence very sparse but present on most surfaces; slightly denser on the gaster and thickest on the funiculi.

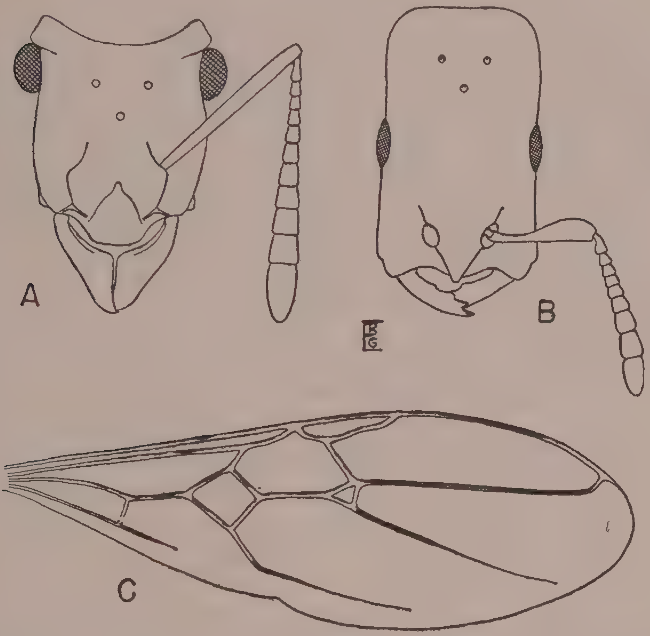
Forewing 5.4 mm. long, with one cubital cell and no closed discal cells; brownish in color.

Color of body black throughout, except tarsi, articulations of legs and antennae, and the mandibles which are dark reddish brown.

Holotype: winged female (M.C.Z. No. 28555).

Described from a single specimen collected by Dr. Kenneth Cooper at Turrialba, Costa Rica. Attached to it is the number Cr 49 F 13.

In 1903 Emery described *Camponotus mirabilis*, and later (1911), described two new species, *C. sphenocephalus*, and *C. longipilis*, with its variety *C. l. postangulata*, belonging to the same group. To-date these seem to be the only forms known, and are all from Peru. Emery placed these ants in the subgenus *Myrmostenus* in 1920, and they are so listed in the Genera Insectorum (1925, Fasc. 183, p. 161). They have in common a very large size, 16 mm. or more, with very straight and elongated bodies and for the most part shining surfaces, giving them a striking appearance. The new species differs from all these in its much smaller size and its color which is practically solid, shining black. Despite this, it appears to belong in the subgenus and to represent a diminutive type. As all forms of *Myrmostenus* are known only as females, it has been suggested that the workers when found will show them to be members of some other group of *Camponotus*, and although this was mentioned by Emery, it has so far not been demonstrated; consequently, the conclusion that these ants form the subgenus *Myrmostenus*, for the present must rest. The new ant from Costa Rica is certainly distinct from the others and deserves to be recorded. No others in the subgenus have been described, as far as I am aware, since 1925 when Emery listed the then known species.



Text-fig. 3. A. *Stictoponera posteropsis, head.* B. *Camponotus (M.) cooperi,* head. C. *Stictoponera posteropsis,* wing.

Camponotus cooperi differs from its above named relatives, which are elephantine by comparison, in a number of additional particulars. The head, though elongate, is not concave on the occipital margin, as in *mirabilis,* and the sides are straight to slightly concave, not converging posteriorly as in *sphenocephalus.* The eyes are placed in the middle of the head and very much to the sides, whereas in *mirabilis* they are moved partially to the dorsal surface. The frontal carinae converge to a blunt point on the anterior margin of the clypeus, the antennae are inserted quite near the anterior end of the head, and the scapes which are short, are greatly thickened, and do not reach beyond the level of the eyes. The mandibles have three teeth (not 7). The sculpture is almost absent, the whole body being very smooth.

Dr. Brown has compared the ant with types of *mirabilis* in the Wheeler Collection, and assures me there is every reason to consider it a new form. He states: "I am practically certain that no species of this subgenus has been described since the end of the war (1945 on). It should be described as new, since *Myrmostenus*, whether or not it is the female of some other subgenus, is very little known, and not recorded outside South America so far as I can tell."

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THE GENERIC NAMES *BLANKAARTIA* OUDEMANS, 1911, AND *TROMBICULOIDES* JACOT, 1938 (ACARI: TROMBICULIDAE)[1]

By H. S. Fuller[2] and G. W. Wharton[3]

The generic names of trombiculid mites have been studied recently by several acarologists. Two of the genera have been based on specimens that were incorrectly identified, so that they fall in the category of genera based on misidentified genotypes. The question of what to do concerning these names was referred to Mr. Francis Hemming, Secretary of the International Commission on Zoological Nomenclature. In a letter, he indicated that the concluding portion of Opinion 168 (namely, the portion which states that, where a genus is considered by specialists to be based on a misidentified type species, that name is to be regarded as of doubtful status pending a definite ruling being given by the Commission in the light of data submitted to it by interested specialists) will be omitted from the revision of the rules of zoological nomenclature in which the opinions will be incorporated with the rules. It is therefore necessary either to apply the principle established in Opinion 168 that designations of type species for genera must stand, or to refer the case to the Commission for use of their plenary powers to suspend the rules. Since the Commission can use its plenary powers only when strict application of the rules will result in greater confusion than uniformity, the type designations for the genera *Blankaartia* and *Trombiculoides* must be accepted.

Oudemans, 1911, designated *Trombidium niloticum* Trägårdh, 1904, as type of a new genus *Blankaartia* (Ent.

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[1] Done both at Harvard University and Duke University in connection with research supported by grants-in-aid from the Division of Research Grants and Fellowships of the National Institutes of Health, U. S. Public Health Service.

[2] Department of Microbiology, Harvard University School of Public Health.

[3] Department of Zoology, Duke University, Durham, North Carolina.

Ber. 3:123). His description of the genus was based on specimens purported to be the larvae of *Trombidium niloticum* by Trägårdh, although Trägårdh stated that the evidence associating these larvae with adults of *Trombidium niloticum* was circumstantial and therefore not conclusive. In fact, these larvae can now be recognized as belonging in a different family from the adults. However, according to the rules *Blankaartia* must retain as genotype *Trombidium niloticum* Trägårdh, 1904.

Berlese, 1912, proposed the subgeneric name *Trägårdhula* with the type *T. nilotica* (Träg.) (Redia 8:4). Since *Blankaartia* and *Trägårdhula* are based on the same type species they are synonyms.

Thor, 1936, proposed the generic name *Pentagonella* with *Trombidium ardeae* Trägårdh, 1904, as type. On the basis of morphological characteristics and geographical considerations it is quite possible that *T. ardeae* and *T. niloticum* are synonyms. However, only rearing experiments will be able to establish their identity. The work of Michener, 1946, has demonstrated that *T. niloticum* and *T. ardeae* are congeneric if not conspecific. Therefore *Pentagonella* Thor, 1936, is also a synonym of *Blankaartia.*

Michener, 1946, reports rearing specimens of *Trombicula* (*Megatrombicula*) *alleei* Ewing, 1926; *Trombicula* (*Megatrombicula*) *velascoi* Boshell and Kerr, 1942; and *Trombicula* (*Megatrombicula*) *attenuata* Michener, 1946. These species he places in the subgenus *Megatrombicula* Michener, 1946, with *Trombicula alleei* Ewing, 1926, as type. These three species are also congeneric with *T. niloticum.*

Womersley, 1948, added to the confusion by trying to settle the problem in his own manner without proper regard for the International Rules on Zoological Nomenclature. He accepts as the genotype of *Blankaartia* the species represented by the larva thought to be *Trombidium niloticum* Trägårdh by Oudemans. He refers to this species as *Blankaartia nilotica* (Träg.) on page 83 and as *Blankaartia nilotica* (Ouds.) on page 84. Actually the species represented by these larvae does not yet have a name. In the same paper Womersley used *Trägårdhula nilotica* as the valid name for *Trombidium niloticum* Trägårdh.

As for the generic names involved, strict application of the rules of priority leads to the following conclusion. *Blankaartia* Oudemans, 1911 (Type *Trombidium niloticum* Trägårdh, 1904) has priority over *Trägårdhula* Berlese, 1912 (Type *Trombidium niloticum* Trägårdh, 1904); *Pentagonella* Thor, 1936 (Type *Trombidium ardeae* Trägårdh, 1904); and *Megatrombicula* Michener, 1946 (Type *Trombicula alleei* Ewing, 1938). All of these names should be applied at the subgeneric level at the present time. The proper name of the species named *Trombidium niloticum* by Trägårdh is therefore *Trombicula* (*Blankaartia*) *nilotica* (Trägårdh), 1904.

The species represented by the larvae associated with *T. nilotica* (Trägårdh) has never been named. It is therefore necessary to name this species. It is a trombidiid and probably belongs to the subfamily Microtrombidiinae. The adult must be known before the species can be assigned with certainty to a subfamily.

Pseudoblankaartia n. gen.

Pseudoblankaartia is characterized by Oudemans, 1912, Zool. Jahrb., Supp. 14: 118-119 under the name *Blankaartia.* The type of *Pseudoblankaartia* n. gen. is hereby designated as *Pseudoblankaartia bequaerti* n. sp.

Pseudoblankaartia bequaerti n. sp.

P. bequaerti is characterized by Oudemans, 1912, Zool. Jahrb., Supp. 14: 119-122 + Figure H. As type of the species we designate the specimen from which Oudemans prepared Figure H.

A similar but less confusing condition exists in the case of *Trombiculoides* Jacot, 1938. Wharton, 1948, explains the details. Now that the portion of Opinion 168 mentioned above has been repudiated, Ewing's 1946 solution of the problem is correct and *Trombiculoides* Jacot, 1938 should be considered a synonym of *Sericothrombium* Berlese, 1910.

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